

In re Patent Application of:

MOREHEAD ET AL.

Serial No. **10/661,435**

Filed: **09/12/2003**

AMENDMENTS TO THE SPECIFICATION

Please replace paragraph [0067] of the specification as published (2005/0058165) with the following amended paragraph:

[0067] Some numerical results comparing $\langle 110 \rangle$ YAG and $\langle 100 \rangle$ YAG are summarized in FIG. 1 and FIGs. 2A-2D. FIG. 1 shows a graph representing a value of the absorbed pump power, for which the $\langle 110 \rangle$ YAG and $\langle 100 \rangle$ YAG crystal orientations yield for equal depolarization loss, versus the ratio of beam diameter to diameter of a pumped region ~~for $\langle 110 \rangle$ YAG and $\langle 100 \rangle$ YAG.~~ For the sake of example, it is assumed that the beam and pumping cross-sections are circular and that the pumped region covers the entire cross-section of the rod, although this need not be the case. From FIG. 1 it can be seen that $\langle 110 \rangle$ has less depolarization than $\langle 100 \rangle$ when the beam diameter (defined, e.g., at $1/e^2$ power) is less than about 45% of the diameter of the pumped region (so beam area less than about 20% cross-sectional area of the pumped region). Even then, the absorbed pump power must be greater than about 1000 Watts. So the $\langle 110 \rangle$ orientation has the advantage only for small, very high power beams. Thus, the inventor's calculations show that, for all other beams, $\langle 100 \rangle$ is the preferred orientation.

Please replace paragraph [0098] of the specification as published (2005/0058165) with the following amended paragraph:

[0098] FIG. 5A depicts an externally frequency-tripled laser 500A having as a gain medium a $\langle 100 \rangle$ -oriented crystal 502A and

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pulsing mechanism 514 disposed within a cavity 501A defined by reflecting surfaces 504A, 506AB. The gain medium may include dopant ions 507 as described above. The cavity 501, crystal 502, reflecting surfaces 504A, 506AB, ions 507, and pulsing mechanism 514 may be as described above with respect to the corresponding components in laser 300 of FIG. 3A. The laser 500A may further include a source 510A of pump radiation 512, which may be a diode laser or flashlamp as described above.

Please replace paragraph [0099] of the specification as published (2005/0058165) with the following amended paragraph:

[0099] One of the reflecting surfaces, e.g. surface 506AB, is partially (e.g., about 10% to about 99%) reflecting with respect to and serves as an output coupler. The laser 500A further includes first and second non-linear elements 516 518 disposed outside the cavity. The first and second non-linear elements are phase-matched as described above to produce third-harmonic radiation TH from the stimulated radiation from the crystal 502A that emerges from the output coupler 506A. Because of the external configuration of the non-linear crystals 516, 518, they need not have Brewster-cut faces. The ultra-low loss of a Brewster face is not as important, though still of some value, with respect to wavelength separation. A higher intensity in e.g., LBO is required for higher conversion efficiency (e.g., greater than about 20%). Thus, focusing into LBO or short pulses with high powers may be needed.